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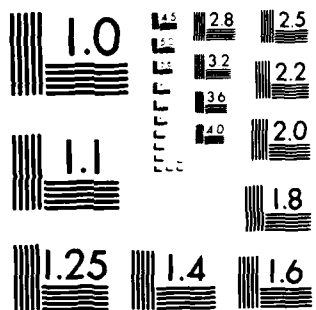
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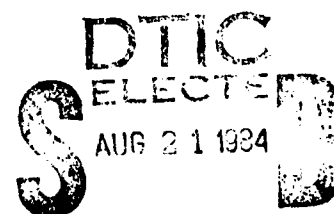
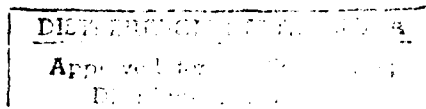
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**CONNECTICUT RIVER BASIN
OLD LYME, CONNECTICUT**

**ROGERS LAKE DAM
CT. 00418**

**PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM**



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**DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.
SEPTEMBER, 1980**

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) DAMS, INSPECTION, DAM SAFETY, Connecticut River Basin Old Lyme, Connecticut		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The dam at Rogers Lake is an earth embankment with vertical concrete walls approximately 129 feet in length including a spillway length of 29 feet. The maximum height of the dam is 7 feet. Based on a visual inspection at the site, the dam is considered to be in FAIR condition. The dam is classified as INTERMEDIATE in size and a SIGNIFICANT hazard structure in accordance with recommended guidelines. Based on size and hazard classification, the adopted test flood for this structure is equal to $\frac{1}{2}$ the PMF.		



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:

NEDED

MAR 06 1981

Honorable William A. O'Neill
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor O'Neill:

Inclosed is a copy of the Rogers Lake Dam (CT-00418) Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Protection, the cooperating agency for the State of Connecticut. In addition, a copy of the report has also been furnished the owner, Town of Old Lyme, Town Hall, Old Lyme, CT 06371.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Protection for your cooperation in carrying out this program.

Sincerely

C. E. EDGAR, III
Colonel, Corps of Engineers
Division Engineer

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As stated

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ROGERS LAKE DAM

CT 00418

CONNECTICUT RIVER BASIN

OLD LYME, CONNECTICUT

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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NATIONAL DAM INSPECTION REPORT

PHASE 1 - INSPECTION REPORT

IDENTIFICATION NO: CT 00418
NAME OF DAM: Rogers Lake Dam
COUNTY AND STATE: New London County,
Connecticut
STREAM: Mill Brook
DATE OF INSPECTION: 15 April, 1980

Brief Assessment

The dam at Rogers Lake is an earth embankment with vertical concrete walls approximately 129 feet in length including a spillway length of 29 feet. The maximum height of the dam is 7 feet. The spillway is an uncontrolled concrete broad crested weir and located about 38 feet from the right dam abutment. The outlet works consists of a gated drop inlet with a 36 inch diameter outlet conduit and is located at the right spillway abutment.

Based on a visual inspection at the site, the dam is considered to be in FAIR condition. However, there are some areas of concern which must be corrected to assure the long term performance of this dam. Signs of concern include: seepage through the downstream concrete wall; large trees next to the downstream face; cracks and spalling of the upstream wall left of the spillway; probable seepage through the downstream face of the spillway; lack of erosion protection on the banks of the discharge channel near the dam; and unprotected low areas on the left and right sides of the dam.

The dam is classified as INTERMEDIATE in size and a SIGNIFICANT hazard structure in accordance with recommended guidelines established by the Corps of Engineers. Based on size and hazard classification, the adopted test flood for this structure is equal to one-half the Probable Maximum Flood (PMF) which is estimated to be 500 CSM, or 4,000 CFS, from the 80 square mile drainage basin. This test flood has a routed outflow discharge equal to 2550 CFS and would overtop the dam by about 3.0 feet. The maximum spillway capacity is equal to 344 CFS which represents only 13 percent of the test flood outflow, therefore, the spillway capacity is considered inadequate.

It is recommended that the Owner engage the services of a registered engineer experienced in the design of dams to accomplish the following: perform detailed hydrologic and hydraulic studies to further assess the

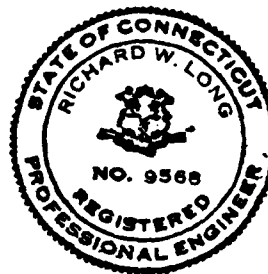
need for and means to increase the project discharge capacity, investigate the significance of the seepage from the downstream concrete wall right of the spillway and downstream spillway face, and recommend measures for monitoring seepage, remove trees at the downstream toe, design measures to prevent water from flowing around either side of the dam during high reservoir levels, and investigate wet areas downstream of the dam adjacent to the left bank.

The above recommendations and other remedial measures as described in Section 7 should be implemented by the owner within one year after receipt of this Phase 1 Inspection Report.

CE MAGUIRE, INC.

By:

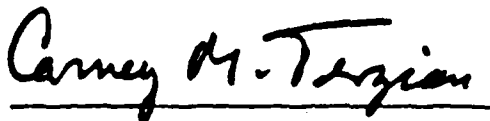
Richard W. Long
Richard W. Long, P.E.
Vice President



This Phase I Inspection Report on Rogers Lake Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.



ARAMAST MAHTESIAN, MEMBER
Geotechnical Engineering Branch
Engineering Division



CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division



RICHARD DIBUONO, CHAIRMAN
Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:



JOE B. FREAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase 1 Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, DC 20314. The purpose of a Phase 1 Investigation is to identify expeditiously those dams which may pose hazards to human life or to property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase 1 investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase 1 inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonable possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

The Phase 1 Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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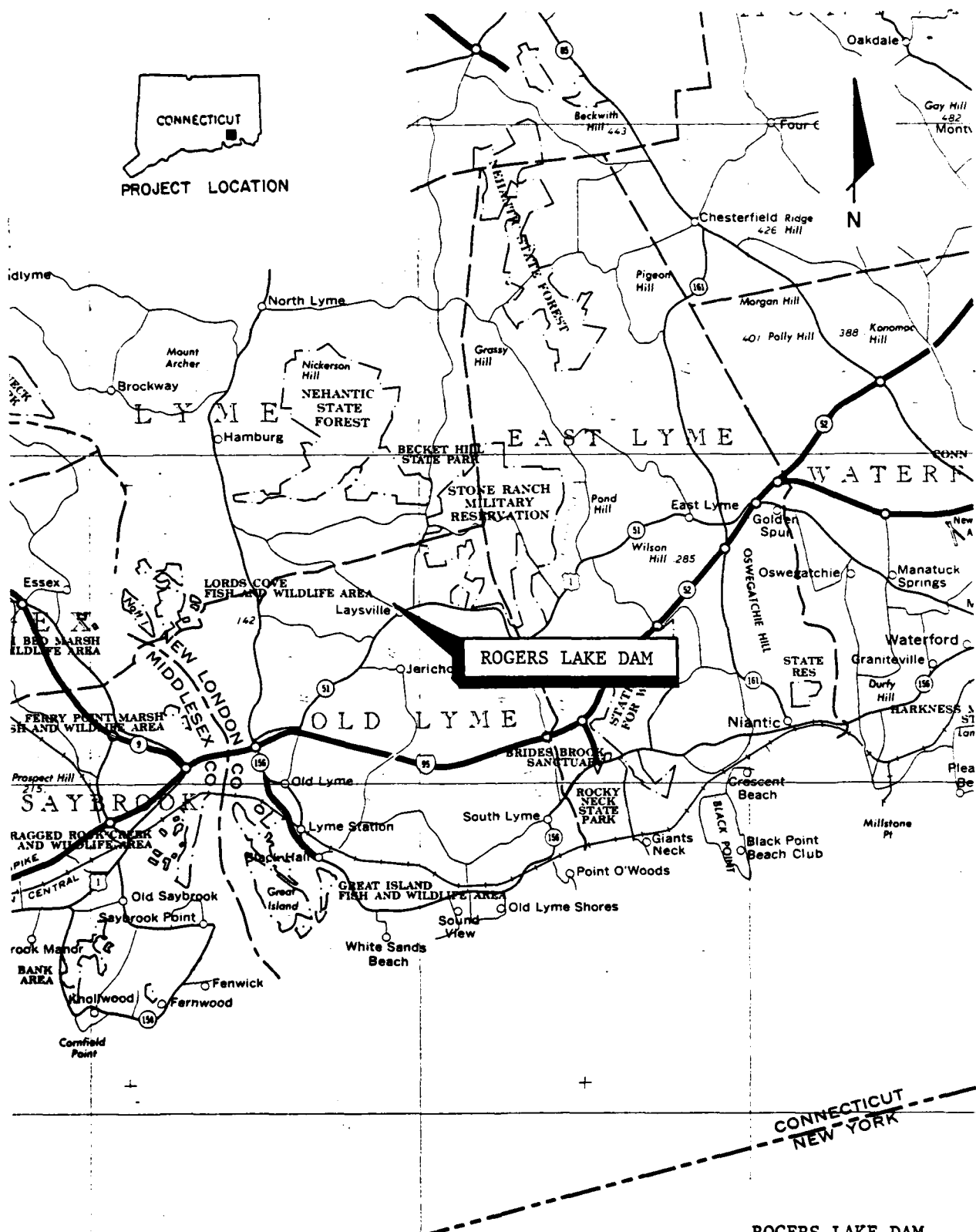
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OVERVIEW PHOTO - Rogers Lake Dam



Scale: 1" = 2.0 miles

ROGERS LAKE DAM

LOCATION PLAN

PLATE NO. 1

NATIONAL DAM INSPECTION PROGRAM

PHASE 1 - INSPECTION PROGRAM

ROGERS LAKE DAM

SECTION 1

PROJECT INFORMATION

1.1 General

- a. Authority. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army through the Corps of Engineers to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. CE Maguire, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed was issued to CE Maguire, Inc. under a letter from Max B. Scheider, Colonel, Corps of Engineers. Contract No DACW33-80-C-0013 has been assigned by the Corps of Engineers for this work.
- b. Purpose of Inspection.
 1. Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.
 2. Encourage and assist the State to initiate quickly effective dam safety programs for non-Federal dams.
 3. To update, verify, and complete the National Inventory of Dams.

1.2 Description of the Project

- a. Location. Rogers Lake Dam is located in the town of Old Lyme, New London County, Connecticut along Town Woods Road approximately 1100 feet north west of the intersection of Town Woods Road and Boston Post Road (Route 51). Coordinates of the dam are approximately 41° 21.0' North Latitude and 72° 18.2' North Longitude. The dam impounds water from Mill Brook which drains an 8.0 square mile watershed of rolling terrain and empties into Lieutenant River, a tributary to the Connecticut River. The lake has a total surface area of 270 acres at the spillway crest level. The axis of the dam is oriented in a northwest-southeast direction with the lake to the northeast.

- b. Description of Dam and Appurtenances. Rogers Lake Dam is approximately 125 feet long (including the overflow spillway), about 7 feet high and has crest width that varies from 12.0 to 20.0 feet. The embankment is earth with vertical concrete walls on both the upstream and downstream faces. The crest profile is relatively level and grass covered. The overflow spillway is located near the center of the dam approximately 38 feet from the right abutment area. The spillway is concrete and is a broad crested weir, 29 feet in length. Spillway overflows drop 4 feet to the streambed of Mill Brook and then flow downstream toward Town Woods Road bridge. The outlet works for the dam is located at the right abutment of the spillway and is a gated drop inlet structure with a 36 inch diameter outlet conduit that has a crest at elevation 36.0 NGVD and invert at elevation 32.0 NGVD. The inlet is protected from clogging by a trash screen and the outlet control is a manually operated vertical sluice gate. The outlet works is in operable condition.
- c. Size Classification. The dam at Rogers Lake has an impoundment capacity at the top of the dam (elev. 38.5 NGVD) equal to 1275 Ac-Ft and a height of 7.0 feet. In accordance with guidelines established by the Corps of Engineers, this dam is classified as an INTERMEDIATE size structure based on its impoundment capacity.
- d. Hazard Classification. This dam is classified as a SIGNIFICANT hazard potential structure because its failure could result in loss of less than a few lives, inundation of 5-10 dwellings and damage to Town Woods Road, Sill Lane, and Mill Lane. There will be 1-2 feet of water in the impacted dwellings. Utility services within the rights of way may temporarily be disrupted. It is estimated that the failure discharge of 1,120 CFS will travel downstream through the Mill Brook streambed with high velocities. Water depths may reach 6.0 feet for a distance of about 11,000 feet downstream to its confluence with Lieutenant River. Increase in depth due to possible failure of dam is 2.0 feet. Depths of flows downstream of the dam before and after the dam failure are 4.0 and 6.0 feet for respective discharges of 344 and 1122 CFS. See Appendix D for additional data.
- e. Ownership. The dam is presently owned by the Town of Old Lyme, Connecticut.
- f. Operator. The gate is maintained and operated by the Town Highway Department:
Mr. R. Harris, Foreman - Highway Department
Town Hall
Old Lyme, Connecticut 06371
(203) 434-2461

- g. Purpose of Dam. Recreation
- h. Design and Construction History. There are no formal records of the history of this dam. However, it is estimated that the original dam was constructed about 1822 to provide a source of water for the Bradbury Woolen Mills. As the textile industry faded in the northeast the dam and mill complex were owned and sold several times. About 1922 the Town of Old Lyme purchased the dam and its appurtenances from the Art Lace and Braid Company. Shortly thereafter the dam was raised to its present level. The Town has undertaken concrete patch work on the structure on several occasions. In 1972 the concrete wing wall at the left abutment was extended, and in 1976 the timber gate for the outlet works was replaced. No other work has been undertaken at the facility.
- i. Normal Operating Procedures. As a rule, the outlet works is opened at the beginning of October of each year and the pool reduced to approximately 18 inches below the spillway crest and that level maintained for a short period to allow shorefront owners to repair beaches and waterfront structures. In addition, because the dam has experienced overtopping from large intense storm activity the highway department personnel will also lower the pool line 6" to 12" in anticipation of heavy storm activity when possible. The reservoir is used solely for recreation.

1.3 Pertinent Data.

- a. Drainage Area. Rogers Lake Dam is located in the Town of Old Lyme, New London, Connecticut. The drainage basin for the dam extends into the communities of Lyme, East Lyme, and Old Lyme with the lake that is formed by the dam almost evenly divided between the Towns of Lyme and Old Lyme. The basin is generally triangular in shape with a maximum length of 5.3 miles and a total area of 8.0 square miles. (See Appendix D for Basin Map) Approximately 10% of the watershed (0.8 square miles) is swampy or natural storage. The topography is generally rolling to flat with elevations ranging from 420 feet at Grassy Hill in East Lyme to 36 feet at the spillway crest of the dam.
- b. Discharge at Damsite. There is no discharge data available for this dam. Listed below is discharge data for the spillway and outlet works:

1. Outlet Works:

Conduit size	36-inch diameter pipe.
	Invert elevation 32.0 feet.

i.	Discharge Capacity	51.3 CFS at spillway crest elevation 36.0 feet.
ii.	Discharge Capacity	77 CFS at the top of the dam. Elevation 38.5 feet.
iii.	Discharge Capacity	99.4 CFS at the test flood. Elevation 41.5 feet.
2.	Maximum known flood at damsite	Unknown
3.	Ungated spillway capacity at top of dam	344 CFS
4.	Ungated spillway capacity at test flood elevation (assuming dam is not overtopped)	1,120 CFS
5.	Gated spillway capacity at normal pool elevation	N/A
6.	Gated spillway capacity at test flood elevation	N/A
7.	Total spillway capacity at test flood elevation (assuming dam is not overtopped)	1,120 CFS
8.	Total project discharge at top of dam	416 CFS
9.	Total project discharge at test flood elevation	2,650 CFS
c.	<u>Elevations</u> (Feet above NGVD)	
1.	Streambed at toe of dam	32.0
2.	Bottom of cutoff	Unknown
3.	Maximum tailwater	Unknown
4.	Recreation pool	36.0
5.	Full flood control pool	N/A
6.	Spill crest	36.0
7.	Design surcharge (Original Design)	Unknown

8.	Top of dam	38.5
9.	Test flood	41.5
d.	<u>Reservoir Lengths (in feet)</u>	
1.	Normal pool	8,000
2.	Flood control pool	N/A
3.	Spillway crest pool	8,000
4.	Top of dam	8,000
5.	Test flood pool	8,000
e.	<u>Storage (acre-feet)</u>	
1.	Normal pool	600
2.	Flood control pool	N/A
3.	Spillway crest pool	600
4.	Top of dam	1,275
5.	Test flood pool	2,058
f.	<u>Reservoir Surface Area (acres)</u>	
1.	Normal pool	270
2.	Flood control pool	N/A
3.	Spillway crest	270
4.	Test flood pool	270
5.	Top of dam	270
g.	<u>Dam</u>	
1.	Type	Vertical concrete walls filled with earth
2.	Length	125 feet including 29.0 feet of spillway
3.	Height	7 feet
4.	Top width	20 feet right embankment 12 feet left embankment

5.	Side slopes	Vertical
6.	Zoning	N/A
7.	Impervious Core	N/A
8.	Cutoff	Unknown
9.	Grout curtain	Unknown
10.	Other	---
h.	<u>Diversion and Regulating Tunnel</u>	N/A
i.	<u>Spillway</u>	
1.	Type	Vertical, free overfall weir
2.	Length of weir	29.0 feet
3.	Crest elevation	36.0 feet
4.	Gates	None
5.	U/S Channel	Natural bed of Reservoir
6.	D/S Channel	Natural bed of Mill Brook
7.	General	D/S Channel passes under a roadway bridge 60 feet downstream (Town Woods Road)
j.	<u>Regulating Outlets</u>	
1.	Invert	32.0 feet
2.	Size	36-inch diameter pipe
3.	Description	Concrete pipe
4.	Control Mechanism	Manually operated gear mechanism, gate structure is not covered
5.	Other	---

SECTION 2

ENGINEERING DATA

2.1 Design

There is no available documentation regarding the design of this facility.

2.2 Construction

No formal records of construction or subsequent repairs are available for this dam. However, certain repairs were done to the dam as detailed in Paragraph 1.2-h.

2.3 Operation

No operation records are maintained.

2.4 Evaluation

- a. Availability. There is no information available.
- b. Adequacy. The lack of in-depth engineering data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance and sound engineering judgement.
- c. Validity. The validity of the limited data must be verified.

SECTION 3

VISUAL INSPECTION

3.1 Findings.

a. General. The Phase 1 visual inspection of the Rogers Lake Dam was conducted on April 15, 1980 by representative of CE Maguire, Inc. and Geotechnical Engineers, Inc. A visual check-list and photographic record of that inspection have been included in Appendix A and C respectively, of this report. At the time of inspection the water level in the reservoir was about 2.5 feet below the top of the dam and about 0.1 feet above the spillway crest. The dam is about 125 feet long and 7 feet high and consists of upstream and downstream vertical concrete walls with an earth fill between the walls. A spillway and control outlet are located near the center of the dam. Inventory data on the dam indicated that it was constructed in 1822 and rebuilt in 1922.

b. Dam.

1. Upstream Face

The upstream face of the dam consists of a 24-in.-wide concrete wall on each side of the spillway (Photos C-1, C-2 and C-3). The visible portion of the wall on the right side of the spillway is in generally good condition and shows no sign of misalignment. The grassy area to the right of the wall is at a lower elevation than the top of the wall, (Photo C-13). The low spot of this grassy area is about 17 feet from the right end of the wall and is about 0.5 feet lower than the top of the wall, (Photo C-5). The wall on the left side of the spillway consists of two sections: a 34-ft.-long, 24-in.-wide section and a 19-ft.-long, 10-in. -wide section. Spalling of both sections was observed and a 1/2 inch wide vertical crack with a 1/4 inch offset was observed near the center of the 10-in.-wide wall, (Photo C-12). The ground surface to the left of the wall is lower than the top of the wall. A 25-ft.-long row of sandbags, partially eroded, is located to the left of the wall (Photos C-13 and C-14). Sandbags were needed to prevent high stages in the lake from flowing around the left abutment of the dam at a low area.

2. Crest

The crest of the dam is the grassy area between the upstream and downstream concrete walls. To the right of the spillway, the width of the crest is about 16.5 feet (Photo C-3). The ground surface is slightly irregular and brush was observed next to the downstream wall. To the left of

the spillway the width of the crest is about 9 feet (Photo C-4). The ground surface is irregular and is barren in places. Several tree stumps up to 6 inches in diameter were observed on the crest.

3. Downstream Face and Toe

The downstream face consists of a 12-inch-wide concrete wall on each side of the spillway, (Photos C-5 and C-7). To the right of the spillway the concrete wall is about 18 feet long and has spalled and cracked in several locations. Seepage was observed through a spalled area at the base of the wall located about 6 feet from the left end of the wall and about 5.5 feet below the top of the wall (Photo C-11). The spalled area has dimensions of about 15 inches by 6 inches, and a wooden rule could be placed 8 inches into the spalled area. The seepage appeared to be clear and was flowing at a rate of about 3 gallons per minute. The area downstream of the right wall is covered with thick brush and trees. A 12-inch diameter tree is located about 7 feet from the right corner of the wall. To the left of the spillway the concrete wall is about 24 feet long with mortared stone blocks forming the right portion of the wall. A 26-inch diameter tree is located about 10 feet from the wall, and several small tree stumps are located close to the downstream toe of the wall. An extensive root system is located near the downstream toe of the wall and is apparently part of the large tree located 10 feet from the wall. A wet area with dimensions of about 25 feet by 10 feet is located just downstream of the large tree shown in Photo C-7 and is about 6 feet below the top of the dam. It could not be determined if the wet area is seepage through the dam. An area of lush green growth, about 7 feet by 7 feet, is located to the left of the downstream wall, (see Photo C-5). The cause of this growth is unknown.

c. Appurtenant Structures

1. Spillway

The spillway section is about 29 feet long and consists of stone blocks capped by concrete (Photos C-5, C-6 and C-7). At the time of inspection water was flowing over the spillway crest and it was not possible to inspect the downstream face of the spillway.

Seepage has been noted through the spillway structure of the dam in the following correspondence:

- a. October 29, 1956 - "...several small leaks in the masonry of the spillway..." and "...leakage at the

toe of a concrete apron on the downstream side of the discharge gate."

- b. April 5, 1971 - "...substantial leak thru the downstream masonry of the spillway section just east of the drawdown pipe."

2. Outlet Works

The outlet works of the dam is located on the right side of the spillway, (Photo C-8 and C-9).

It is a gated drop inlet structure with a 36 inch diameter outlet conduit. The inlet is protected from clogging by a trash screen and the conduit is controlled by a manually operated timber sluice gate. There was evidence of cracking of the outlet structure. The gate was recently replaced and was in good condition.

d. Reservoir Area

There were no indications of slope instability along the shore of the reservoir in the vicinity of the dam (See Photos C-7 and C-13).

e. Downstream Channel

The downstream channel is the natural streambed. A small island is located in the center of the downstream channel near the spillway section (Photos C-7 and C-10). A small tree and tree stumps are located on the island. The downstream channel passes under a roadway bridge about 57 feet from the spillway. The banks of the downstream channel between the dam and bridge are unprotected earth.

3.2 Evaluation

On the basis of the visual inspection, the dam is judged to be in FAIR condition because of the following features:

- a. Seepage through the downstream concrete wall of the dam which could lead to erosion of the dam and instability of the concrete walls.
- b. Large trees next to the downstream face of the dam which could be uprooted during a storm causing instability of the dam. Roots near the dam which could provide paths for seepage.
- c. Cracks and spalling of the upstream concrete wall left of the spillway which could lead to instability of the dam.

- d. Probable seepage through the masonry forming the downstream face of the spillway.
- e. Absence of adequate erosion protection on the banks of the downstream channel near the dam.
- f. Low areas on the left and right sides of the dam which could be overtopped during high reservoir levels.

SECTION 4

OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

- a. General. Rogers Lake is used by Town residents as a recreational facility. The highway department under the direction of the highway foreman operates the dam for this purpose. As a general rule, the reservoir pool level is lowered approximately 18 inches at the beginning of October each year to permit lake front homeowners to repair and rehabilitate their beaches and waterfront structures. An attempt is also made to reduce the pool level on early warning of an intense impending storm.
- b. Description of Any Warning System. The dam is observed daily by highway personnel during the summer recreational season and at least weekly during the winter. Any changed or serious conditions would be reported to the highway foreman and the Town Selectman and appropriate action taken. Early warning of forthcoming storm activity is generally obtained through local weather forecasts. There is no formalized emergency action plan for the dam.

4.2 Maintenance Procedures

- a. General. The highway department is responsible for all maintenance at the dam. This maintenance is generally minor grass trimming and clearing of brush. The outlet works sluice gate was replaced several years ago and minor concrete patch work has been accomplished in the past by the department personnel. No other maintenance has been required.
- b. Operating Facilities. The outlet works is normally operated several times during the year, providing the Owner with knowledge of its conditions and need for repair, on a continuing basis.

4.3 Evaluation

Observations of the dam are conducted on a regular basis and operational equipment tests also performed periodically. Minor maintenance (grass and brush trimming) appears to be suitable for the facility. Major deficiencies that are found would be reported directly to the highway department and a program of repair established depending on the severity of the item. Maintenance procedures are judged to be adequate for the structure.

Emergency procedures and notifications of proper authorities should be formalized for this dam. Included in the "Emergency Action Plan" should be the locations of emergency equipment, materials, and personnel as well as a dewatering procedure to prevent or minimize

dam failure or overtopping. Highway personnel should be briefed and alerted to potentially hazardous signs and areas to check in the field at the dam on a regular basis in order to provide the notification of impact area residents.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

- 5.1 General. Rogers Lake, with a drainage area of 8.0 square miles, is located in the Towns of East Lyme, Lyme, and Old Lyme, Connecticut. The dam site is located along Town Woods Road approximately 1,100 feet from the intersection of Town Woods Road and Boston Post Road in Old Lyme. Typical basin characteristics of the watershed are rolling to flat slopes, small storage capacity (about 10 percent natural swamps or valley storages) and terrain that is densely wooded.

The total length of the dam is 125 feet. The storage capacity is equal to 600 Ac-Ft at the spillway crest (36.0 feet) and can accommodate 1.40 inches of runoff from the watershed. Each foot of depth in the reservoir pool above the spillway crest represents 270 Ac-Ft of storage or 0.63 inches of runoff from the basin. Because one foot of depth in the reservoir at the spillway crest is equal to 0.63 inches of runoff it is estimated that overtopping of the dam by the test flood cannot be eliminated by lowering the pool level prior to storm inflow.

- 5.2 Design Data. No specific design data is available for this watershed or structure. In lieu of existing design information, U.S.G.S. topographic maps (scale 1" = 2,000 ft.) were utilized to develop hydrologic parameters such as: drainage area, reservoir surface areas, basin slopes, time of concentration and other runoff characteristics. Elevation/storage relationships for the reservoir were approximated. Surcharge storage was computed assuming the surface area remained constant above the spillway crest. Some of the pertinent hydraulic data was obtained and/or confirmed by actual field measurements at the time of the visual inspection. Test flood inflows and outflows and dam failure flows were determined in accordance with the Corps of Engineers guidelines. Final values used in this report are quite approximate and are no substitute for actual detail analysis.

- 5.3 Experience Data. No historical data for recorded discharges or water surface elevations is available for this dam. It was reported by an adjacent home owner, as well as the highway foreman, that the dam has experienced frequent overtopping from large storms. The overtopping occurs by high reservoir stages flowing around the left abutment area and then returning to the river. This has been prevented in some cases by the installation of sand bags.

- 5.4 Test Flood Analysis. Recommended guidelines for the Safety Inspection of Dams by the Corps of Engineers were used for the selection of the Test Flood. Under those guidelines, the dam is classified as a SIGNIFICANT hazard and INTERMEDIATE size structure and warrants testing by a storm event ranging from one-half the Probable Maximum Flood (PMF) to the full PMF. The watershed has a

total drainage area equal to 8.0 square miles of which 10 percent or 0.8 square miles is swampy or natural storage. The drainage area is sparsely populated and largely wooded. The average basin slope is approximately 0.003 feet per foot and is considered flat. The overall hydrologic parameters of the basin indicate the watershed should be classified as rolling terrain and flat. Consequently, because of the watershed characteristics and the size of the dam (i.e. on the low side of the intermediate classification) a test flood equal to one-half the PMF (500 CSM) or 4,000 CFS was adopted for this analysis. Outflow discharges were also developed using Corps of Engineers criteria and approximate routing techniques with a uniform crest elevation of 38.5 and overtopping allowed. The routed outflow discharge for the test flood inflow is 2,550 CFS with outlets closed. The spillway and outlet rating curves are illustrated in Appendix D. Flood routings were performed with an assumed full pond condition (pool level at spillway crest). Towns Wood Road will not affect the computed maximum spillway outflow.

The spillway capacity is hydraulically inadequate to pass the test flood outflow and the test flood would overtop the dam by approximately 3.0 feet. The maximum outflow capacity of the spillway is 344 CFS or only 13 percent of the test flood outflow discharge. At the spillway crest level the capacity of the outlet structure is 51.3 CFS. Using the outlet works it will require 68 hours to lower the pool one foot. For the total storage to be drained through the outlet works it will require 13 days.

- 5.5 Dam Failure Analysis. An instantaneous full depth - partial width breach equal to 25% of the length of dam or 25 feet was adopted based on visual inspection of the downstream topographic features. The adopted width of breach was based on visual inspection of the channel immediately downstream of the dam.

The calculated dam failure discharge of 1,120 CFS assumes the reservoir full (at the top of the dam) just prior to failure when maximum spillway discharge was 344 CFS and will produce an approximate water surface level of elevation 35.0 feet immediately downstream from the dam (about 2.0 feet above the depth just prior to failure.) The depths of flow before and after the failure of the dam are 4.0 and 6.0 feet, respectively. The estimated damage reach extends downstream 11,000 feet with normal flow in the channel. The failure could result in loss of less than a few lives, inundation of 5-10 dwellings and potential damage to Town Woods Road, Sill Lane and Mill Lane. It is estimated that a water depth of 1 foot will occur in those dwellings impacted by the failure flow. Utility services located within the rights of way of the roadways may temporarily be disrupted. It is estimated that high velocities of flow may cause erosion along the streambanks and undermining of foundations of dwellings adjacent to the stream resulting in foundation settlements or sliding. The prime impact area has been estimated, if the dam were to fail, and has been delineated on the drainage basin map in Appendix D. Discharge from the outlet structure is

excluded from the total failure discharge computations assuming them to be inoperable and/or insignificant. As a result of the failure analysis, the dam has been classified as a SIGNIFICANT hazard structure. Towns Wood Road would not be overtopped by failure flow discharge.

ROGERS LAKE DAM

Inflow, Outflow and Surcharge Data

FLOOD	24-HOUR TOTAL RAINFALL IN INCHES	24-HOUR* RUNOFF IN INCHES	MAXIMUM INFLOW IN CFS	MAXIMUM** OUTFLOW IN CFS	SURCHARGE HEIGHT IN FEET	SURCHARGE STORAGE ELEVATION
$\frac{1}{2}$ PMF = Test Flood	11.9	9.5	4000	2550	5.5	41.5

*Infiltration assumed as 0.1"/hour

**Lake assumed initially full at spillway crest elevation 36.0
(top of dam = 38.50)

NOTES:

1. $\frac{1}{2}$ PMF = Test Flood computation based on COE guidelines.
2. The maximum capacity of the spillway without overtopping the top of the dam (elevation 38.5 feet) is equal to 344 CFS.
3. All discharges indicated are dependent upon the continued integrity of upstream storage reservoirs.
4. Surcharge storage is assumed to overtop the dam when exceeding the spillway capacity.
5. Test flood = one-half PMF = 500 CSM = 4,000 CFS (D.A. = 8.0 sq. miles).

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

- 6.1 Visual Observations. The visual observations did not disclose any indications of present structural instability. The long-term performance of the dam could be affected by the following features: seepage through downstream concrete wall, cracking and spalling of the upstream concrete spillway, possible seepage through the spillway and trees growing near the downstream face.
- 6.2 Design and Construction Data. No design or construction drawings or construction records of the dam are available.
- 6.3 Post-Construction Changes. The dam was rebuilt in 1922, but the extent of the rebuilding is unknown.
- 6.4 Seismic Stability. The dam is located in Seismic Zone 1 and, in accordance with the recommended Phase 1 guidelines, does not warrant seismic stability analysis.

SECTION 7

ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

7.1 Assessment.

- a. Condition. Based on the visual inspection, the dam is judged to be in FAIR condition. Features which could adversely affect the condition of the dam in the future are:
 1. Seepage through the downstream concrete wall.
 2. Large trees growing adjacent to the downstream embankment face.
 3. Cracks and spalling of the concrete work of the dam.
 4. Seepage through the spillway.
 5. Inadequate erosion protection for the downstream channel adjacent to the dam.
 6. Low areas at the left abutment of the dam that require sand bagging.
- b. Adequacy of Information. The available information is such that the assessment of the condition of the dam must be based on visual observations.
- c. Urgency. The recommendations and remedial measures described below should be implemented by the owner within one year after receipt of the Phase 1 report.

7.2 Recommendations.

The following recommendations should be carried out under the direction of a qualified registered engineer.

1. Inspect the downstream face of the spillway when there is no flow over the spillway.
2. Investigate the significance of 1) seepage from the downstream concrete wall right of the spillway and 2) probable seepage from the masonry forming the downstream face of the spillway, and recommend measures for monitoring the seepage and/or preventing piping of soil from the dam.
3. Investigate the source of 1) the wet area downstream of the dam adjacent to the left bank of the downstream channel and 2) the lush growth left of the downstream face of the dam. Assess the significance of the cause of these features and recommend measures for controlling them if necessary.

4. Remove trees between the dam and roadway bridge and backfill root depressions with appropriate soils.
5. Investigate the source of the irregular ground surface of the crest. Regrade the crest, establish grassy vegetation on the crest, and monitor the surface of the crest during future inspections.
6. Perform detailed hydrologic and hydraulic studies to further assess the need for and means to increase the project discharge capacity.

7.3 Remedial Measures.

a. Operation and Maintenance Procedures.

1. Clear brush and trees from the banks of the downstream channel between the dam and roadway bridge and place riprap on the banks for erosion protection.
2. Repair spalled concrete and cracks in the structures.
3. Clear brush and trees on the crest of the dam and adjacent to the downstream face of the dam.
4. Institute a program of annual technical inspection by a qualified registered engineer.
5. Implement a regular maintenance program.
6. Develop and "Emergency Action Plan" that will include an effective preplanned downstream warning system, locations of emergency equipment, materials and manpower, authorities to contact and potential areas that require evacuation. Monitoring during flood periods should be included in the plan.

7.4 Alternatives.

There were no practical alternatives to the above recommendations considered.

APPENDIX A
INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT Rogers Lake Dam DATE April 15, 80
TIME A.M.
WEATHER Fair
W.S.ELEV. 36.1 U.S. 32.2 D.S.

PARTY: Hydrology &
1. S. Khanna, CEM / Hydraulics 6. _____
2. E. Dessert, CEM / Civil 7. _____
3. R. Brown CEM / Civil 8. _____
4. R. Murdock, GEI / Geotechnical 9. _____
5. T. Keller, GEI / Geotechnical 10. _____

PROJECT FEATURE	INSPECTED BY	REMARKS
1. _____		
2. _____		
3. _____		
4. _____		
5. _____		
6. _____		
7. _____		
8. _____		
9. _____		
10. _____		

PERIODIC INSPECTION CHECKLIST

PROJECT Rogers Lake Dam DATE April 15, 1980

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>DAM EMBANKMENT</u>	
Crest Elevation	36.0
Current Pool Elevation	36.1
Maximum Impoundment to Date	Unknown
Surface Cracks	None of significance in earth fill between concrete walls. Occasional cracking and spalling of concrete walls on upstream and downstream sides of earth fill, but no significant movement of walls.
Pavement Condition	No pavement.
Movement or Settlement of Crest	None that could be attributed to movement of the dam, but topo is irregular on left side between and around concrete walls.
Lateral Movement	No significant lateral movement observed.
Vertical Alignment	No vertical misalignment of significance observed.
Horizontal Alignment	No horizontal misalignment of significance observed.
Condition at Abutment and at Concrete Structures	Sandbags at left abutment; abutment area is lower than the top of the dam.
Indications of Movement of Structural Items on Slopes	No structural items.
Trespassing on Slopes	None of significance.
Sloughing or Erosion of Slopes or Abutments	None of significance.

PERIODIC INSPECTION CHECKLIST

PROJECT Rogers Lake Dam DATE April 15, 1980

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>DAM EMBANKMENT</u> (Cont.)	
Rock Slope Protection - Riprap Failures	No riprap.
Unusual Movement or Cracking at or Near Toe	None of Significance.
Unusual Embankment or Downstream Seepage	Seepage through spalled area in downstream face of concrete on right side of dam. Wet area left of downstream channel which may be seepage.
Piping or Boils	None observed.
Foundation Drainage Features	None
Toe Drains	None
Instrumentation System	None
Vegetation	26 - inch diameter tree 10 feet from downstream face of dam (left side); brush growth on earth fill (right side); area of lush green growth - left side.

PERIODIC INSPECTION CHECKLIST

PROJECT Rogers Lake Dam DATE April 15, 1980

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE</u>	
a. Approach Channel	Same approach as for spillway (approach from lake).
Slope Conditions	Edge of lake wooded.
Bottom Conditions	Sand and gravel.
Rock Slides or Falls	None
Log Boom	None
Debris	Branches fouling intake gate.
Condition of Concrete Lining	None
b. Intake Structure	
Condition of Concrete	Good
Stop Logs and Slots	None

PERIODIC INSPECTION CHECKLIST

PROJECT Rogers Lake Dam DATE April 15, 1980

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - CONTROL TOWER</u>	
a. Concrete and Structural	Gate control consists of vertical lift timber gate (3-4 years old), treated timber in good condition. Gate stem is treated timber with steel rack and pinion mechanism. Lift mechanism is operated with wrench.
General Condition	Good
Condition of Joints	Good
Spalling	None
Visible Reinforcing	None
Rusting or Staining of Concrete	None
Any Seepage or Efflorescence	Not observable.
Joint Alignment	Good
Unusual Seepage or Leaks in Gate Chamber	Not observable.
Cracks	None observed.
Rusting or Corrosion of Steel	None observed.

PERIODIC INSPECTION CHECKLIST

PROJECT Rogers Lake Dam DATE April 15, 1980
 INSPECTOR _____ DISCIPLINE _____
 INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - TRANSITION AND CONDUIT</u>	Not observable.

PERIODIC INSPECTION CHECKLIST

PROJECT Rogers Lake Dam DATE April 15, 1980
 INSPECTOR _____ DISCIPLINE _____
 INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</u>	Outlet channel is the same as the spillway discharge channel.
General Condition of Concrete	Good
Rust or Staining	None observed.
Spalling	Slight
Erosion or Cavitation	None
Visible Reinforcing	None
Any Seepage or Efflorescence	Not observable, however seepage into discharge conduit was reported by a local resident.
Condition at Joints	Good
Drain Holes	None
Channel	Natural Streambed.
Loose Rock or Trees Overhanging Channel	Trees overhanging channel.
Condition of Discharge Channel	Good

PERIODIC INSPECTION CHECKLIST

PROJECT Rogers Lake Dam DATE April 15, 1980

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS- SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u>	
a. Approach Channel	Direct approach from body of lake.
General Condition	Good
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Approach Channel	Natural sand and gravel.
b. Weir and Training Walls	Concrete
General Condition of Concrete	Good
Rust or Staining	None
Spalling	Slight
Any Visible Reinforcing	None observed.
Any Seepage or Efflorescence	None observed, however a local resident reports seepage through face of weir structure (stone blocks with a concrete cap).
Drain Holes	None
c. Discharge Channel	
General Condition	Good
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	Yes
Floor of Channel	Natural gravel, cobbles and boulders.
Other Obstructions	Bridge 57 feet downstream of weir.

APPENDIX B

ENGINEERING DATA

APPENDIX B-1

Correspondence pertaining to the history, maintenance, and modifications to the Rogers Lake Dam as well as copies of past inspection reports are located at:

State of Connecticut
Department of Environmental Protection
State Office Building
165 Capitol Avenue
Hartford, Connecticut 06115
Attention: Mr. Victor J. Galgowski,
Dam Safety Engineer

APPENDIX B-2

SELECTED COPIES OF PAST INSPECTION REPORTS

No. 001

WATER RESOURCES COMMISSION
SUPERVISION OF DAMS
INVENTORY DATA

Inventoried
By WPS

Date 30 JUNE 1964

5
CT-418

Name of Dam or Pond ROGERS LAKE

Code No. C 2.7 LT 2.5 ML 2.2.

Nearest Street Location TOWN WOODS ROAD

Town OLD LYME Long 74-18.1

U.S.G.S. Quad. OLD LYME

Name of Stream MILL BROOK Lat 41-21

Owner TOWN OF OLD LYME

Address OLD LYME CONNECTICUT 06371

1/2
7/73

Pond Used For RECREATION DA 7.535M

Dimensions of Pond: Width 1200 FEET Length 8500 FEET Area 280.2649 ACR.

Total Length of Dam 100 FEET Length of Spillway 30 FEET

Location of Spillway CENTER OF DAM

Height of Pond Above Stream Bed 5 FEET

Height of Embankment Above Spillway 4 FEET

Type of Spillway Construction CONCRETE

Type of Dike Construction CONCRETE, EARTH DOWN STREAM

Downstream Conditions CULVERT UNDER TOWN WOODS ROAD

Summary of File Data REPORT BY B. H. PALMER DATED 11-1-56

COMMENTING ON LEAKS IN THE DAM AND SAYING THAT

Remarks THEY WERE NOT SERIOUS

Would Failure Cause Damage? YES Class B

122
rebuild
1922

SUNDAY COURANT
HARTFORD, CONN.

CIRC. 183,450

JAN 12 1969

New
England

Old Lyme

Who Owns Lake? Sorry You Asked

OLD LYME

OLD LYME (Special) — Who mission is contemplating legis-
lating Rogers Lake? The Plan-
ning Commission is not glad
that you asked.

It seems that certain lake-
front residents wanted to take
advantage of the lowered water
level in the lake and extend sea
walls into the lake.

When one resident asked per-
mission of the Planning Com-
mission to do this, the commis-
sion found that neither they, nor
any other group in town, had
control over the lake. So before
filling in the lake, it appears
someone would have to show re-
cord of ownership dating back,
in all probability, to 1665, the
year the town was separated
from Old Saybrook.

A recommendation to deter-
mine ownership of Rogers Lake
was then made to the State Wa-
ter Resources Commission by
town officials to prevent the fill-
ing in of a portion of the water-
front.

SWRC said it had no authority
in the matter, and suggested the
town contact the owner and
have him issue a cease and
desist order.

One town official said the lake
would be completely filled in
and just a memory by the time
the owner was found.

Meanwhile, the planning com-

mission is contemplating legis-
lation to give ownership of the
lake to the town.
Attorney E. Lea Marsh, a for-
mer state senator, has suggest-
ed that a bill be submitted to
the legislature giving some
agency in the town, possibly the
Planning Commission, authority
to regulate any request concern-
ing the lake.

Marsh has written to the Leg-
islative Commissioner's office
for information but has received
no reply to date.

Marsh said this is a problem
and we hope to correct it with
appropriate legislation. He add-
ed that he thought of going to
the legislature, because when he
was a member of the state sen-
ate, the legislature passed a law
preventing commercial ice fish-
ing at the lake.

If a bill is submitted, it will
be done so by either State Rep.
Jack Tiffany, of Lyme, or State
Senator William Moore of Old
Lyme.

Ownership of the lake may
not be the goldmine that it ap-
pears. Almost all the land
around the lake is privately
owned. And there is the matter
of virtually every back tax
since the Stamp Act. Plus inter-
est.

STATE WATER RESOURCES
COMMISSION
RECEIVED

AUG - 9 1971

ANSWERED _____

REFERRED _____

FILED _____

Lake Drive, West Shores
Rogers Lake, Old Lyme
Conn 06371

State of Connecticut
Water Conservation Comm.
Hartford, Conn.

To whom it may concern.

As a resident I am concerned
with the following problem. If
your office does not have the
jurisdiction please refer it
to the proper agency.

On several occasions I have
noted that large trucks have
been drawing water from
the base of the dam at
Rogers Lake in Old Lyme, Conn.

As there are regulations
concerning this practice?

My concern is based on the
premise that private
contractors should pay for
the gallons of water
(over)

they draw from Conn. sources
moment as they use this
free water in their business.

As a land owner I pay
electric charges for power to
draw water from Rogers Lake.

I cannot receive one instance with
the other.

Please be good enough to inform
me if this practice is
permitted under law and
if a complaint can be
submitted against the user
of this free water for
commercial purposes.

Very truly

Rudolph A. Bray

June 29, 1972

Mr. Merle S. Bugbee
First Selectman
Memorial Town Hall
Old Lyme, Connecticut 06371

Re: Rogers Lake Dam
Old Lyme

Dear Mr. Bugbee:

Thank you for your letter of June 27, 1972 and attached sketch indicating a proposed retaining wall along the shoreline of the subject lake.

Since this construction would be along the shoreline abutting the end of the dam and no construction or modifications on the dam itself are contemplated, a Construction Permit from this department would not be required for this work.

Very truly yours,

William H. O'Brien, III
Civil Engineer

WHO:ljg

TOWN OF OLD LYME
MEMORIAL TOWN HALL

OLD LYME, CONNECTICUT 06371



BOARD OF SELECTMEN

TELEPHONE 434-1805
AREA CODE 208

June 27, 1972

Mr. William H. O'Brien III
Water Resource Commission.
State Office Building
Hartford, Connecticut 06115

Re: Rogers Lake Dam, Extension of South Wing Wall

Dear Mr. O'Brien:

Please advise me of procedures to follow if the Town of Old Lyme is required to obtain State permission to extend the south wing of Rogers Lake Dam.

The extension will be about 35' in length. It will not raise the level of the lake and will eliminate the possibility of the lake overflowing around the south end of the present wall, a problem we are now faced with every time we have extensive rain falls.

Very truly yours,

Merle S. Bugbee
First Selectman

Enclosure: Rough Sketch

MSB:eh

MAILED & RELATED
RECEIVED
JUL 1 1972

Water Resources

October 15, 1971

Mr. Rudolph A. Brey
Lake Drive
Rogers Lake West Shore
Old Lyme, Connecticut 06173

Re: Rogers Lake Dam
General Correspondence
Old Lyme

Dear Mr. Brey:

This is in reply to your question concerning withdrawal of water from the stream below the subject dam by trucks.

We know of no specific state statute which is applicable to the situation which you describe.

We suggest that you seek legal counsel on how best to proceed in this matter.

Very truly yours,

William H. O'Brien, III
Civil Engineer

WHO:ljg

cc: Dan W. Lufkin, Commissioner
Department of Environmental Protection

April 5, 1971

Mr. Merle S. Bugbee
First Selectman
Town of Old Lyme
Memorial Town Hall
Old Lyme, Connecticut 06371

Re: Rogers Lake Dam
Old Lyme

Dear Mr. Bugbee:

On March 29, 1971 the undersigned inspected the subject dam with you as a result of your request in your letter dated March 11, 1971.

The dam appeared to be in satisfactory condition. There was a fairly substantial leak thru the downstream masonry of the spillway section just east of the draw down pipe. The leak was about 3 feet below the spillway and is apparently the same one mentioned in a letter dated November 1, 1956 from B. H. Palmer, Member State Board for Supervision of Dams to Paul W. Hains, First Selectman, Old Lyme. There was no question of the safety of the dam at that time and it does not appear to be a safety consideration at this time in light of the fact that it has been leaking for many years and you felt that there had been no noticeable increase in the volume of the leak.

In order to conserve water you may wish to try to stop this leak from the downstream side. If there is an "undercut" in the joint between the stones, packing with lead wool and facing with concrete may stop this leak. The lead wool is available in hardware or plumbing supply stores. If this method is attempted, please advise as to results.

Very truly yours,

William H. O'Brien, III
Civil Engineer

WHO:ljg

P.S. Comment on other dams in separate letters.

TOWN OF OLD LYME
MEMORIAL TOWN HALL

OLD LYME, CONNECTICUT 06371



BOARD OF SELECTMEN

TELEPHONE 434-1803
AREA CODE 203

March 11, 1971

State Board for the Supervision of Dams
Water Resources Commission
State Office Building
Hartford, Connecticut 06115

Re: Letter of 3-10-71, Inspection of Upper Mill Pond Dam

Gentlemen:

On the tenth of March I wrote you requesting an inspection of the Upper Mill Dam in the Town of Old Lyme.

Since you, in all probability, will grant my request, I would like to have you check all three dams when you make the check.

If possible, could you let me know a few days ahead of your planned inspection, and I will be available to accompany your engineer on the inspection.

Very truly yours,

A handwritten signature in cursive script, reading "Merle S. Bugbee".

Merle S. Bugbee
For the Board of Selectmen

MSB:eh

cc-Mr. Kneeland

STATE WATER RESOURCES
COMMISSION
RECEIVED

MAR 15 1971

ANSWERED _____
REFERRED _____
FILED _____

August 3, 1967

Merle S. Bugbee
First Selectman
Town of Old Lyme
Memorial Town Hall
Old Lyme, Connecticut 06371

Dear Mr. Bugbee:

In answer to your letter to Mr. Willis J. Snow dated July 12, 1967, the Rogers Lake Dam was inspected on August 1, 1967. The dam was found to be in essentially good condition. It was noted that an area of concrete on the northwest wing wall is spalling and should be repaired to prevent further damage. In addition, the small trees and brush that is growing on the southeast wall should be removed.

The condition of the dam does not appear to be changed from the last inspection by this agency on June 30, 1964.

Very truly yours,

William P. Sander
Engineer - Geologist

WPS:rek

TOWN OF OLD LYME
MEMORIAL TOWN HALL

OLD LYME, CONNECTICUT 06371

BOARD OF SELECTMEN

TELEPHONE 434-1603
AREA CODE 203

July 12, 1967

Mr. Willis J. Snow, Principal Engineer
State Board for the Supervision of Dams
State Office Building
Hartford, Connecticut

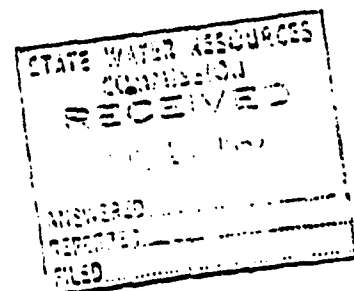
Dear Mr. Snow:

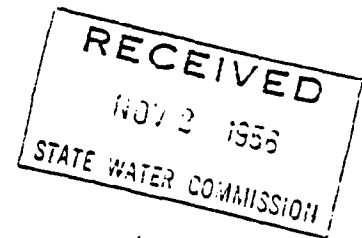
The Town of Old Lyme requests that the town owned dam at Rogers Lake be subjected to an inspection by your department as provided by Section 25-111, General Statutes, Volume 5, 1965 Supplement.

I believe this dam to be in a reasonably safe condition, but would appreciate the opinion and recommendation of your engineers.

Very truly yours,

Merle S. Bugbee
Merle S. Bugbee
First Selectman





November 1, 1956

Mr. Paul W. Mains
First Selectman
Old Lyme, Connecticut

Dear Sir:-

This afternoon I looked at the Dam at Rogers Lake in Old Lyme. The water was about 13" below full pond and the gate was closed. There was a substantial leak through the spillway section a short distance from the gate and this leak was about 30" below the top of the spillway. I would think that this leak would be substantially greater during high water. There is no question of safety of the Dam but I can see that it loses a good deal of water through these leaks. I suggest that you open the gate and draw the pond down another 2 feet. After it is drawn down you can construct a small sand bag coffer dam around the inlet of the gate and around that portion of the spillway where the leaks are the worst. I think then that all the leaves and debris should be cleaned out from in back of the dam and facing concrete about 3" thick put in back of the spillway and carried down at least below the depth of the leaks. This concrete should be carried around into the opening which is in front of the gate. I am sure that this would stop the leaks in a satisfactory manner.

The cheaper way would be to draw the pond down and clean out the leaves etc. and backfill with good clay which would have a tendency to fill up the cracks where the water is coming through. However, this is not a sure method and I recommend that you do it with concrete. It would be desirable to carry the concrete all the way across the spillway but it will be up to you as to how much you want to do.

Very truly yours,

J. H. Snow
Member, State Board for Supervision
of Dams

BMP/cw
c.c.: Mr. Willis J. Snow
Principal Engineer

State Water Commission

October 29, 1956

Mr. Benjamin H. Palmer
Chandler & Palmer
16 Franklin Street
Norwich, Connecticut

Dear Mr. Palmer:

Mr. Paul W. Hains, First Selectman of Old Lyme, called my home last week to say that the dam at Rogers Lake in Old Lyme was leaking and they had been unable to determine where the trouble lay. I took a quick look at it the following day and observed that, in addition to several small leaks in the masonry of the spillway, there was considerable leakage at the toe of a concrete apron on the downstream side of the discharge gate. It was impossible at the time to determine if there were other serious leaks.

Will you kindly investigate this matter when opportunity permits in order that any necessary repairs may be made as soon as possible?

Thank you for this favor.

Sincerely yours,

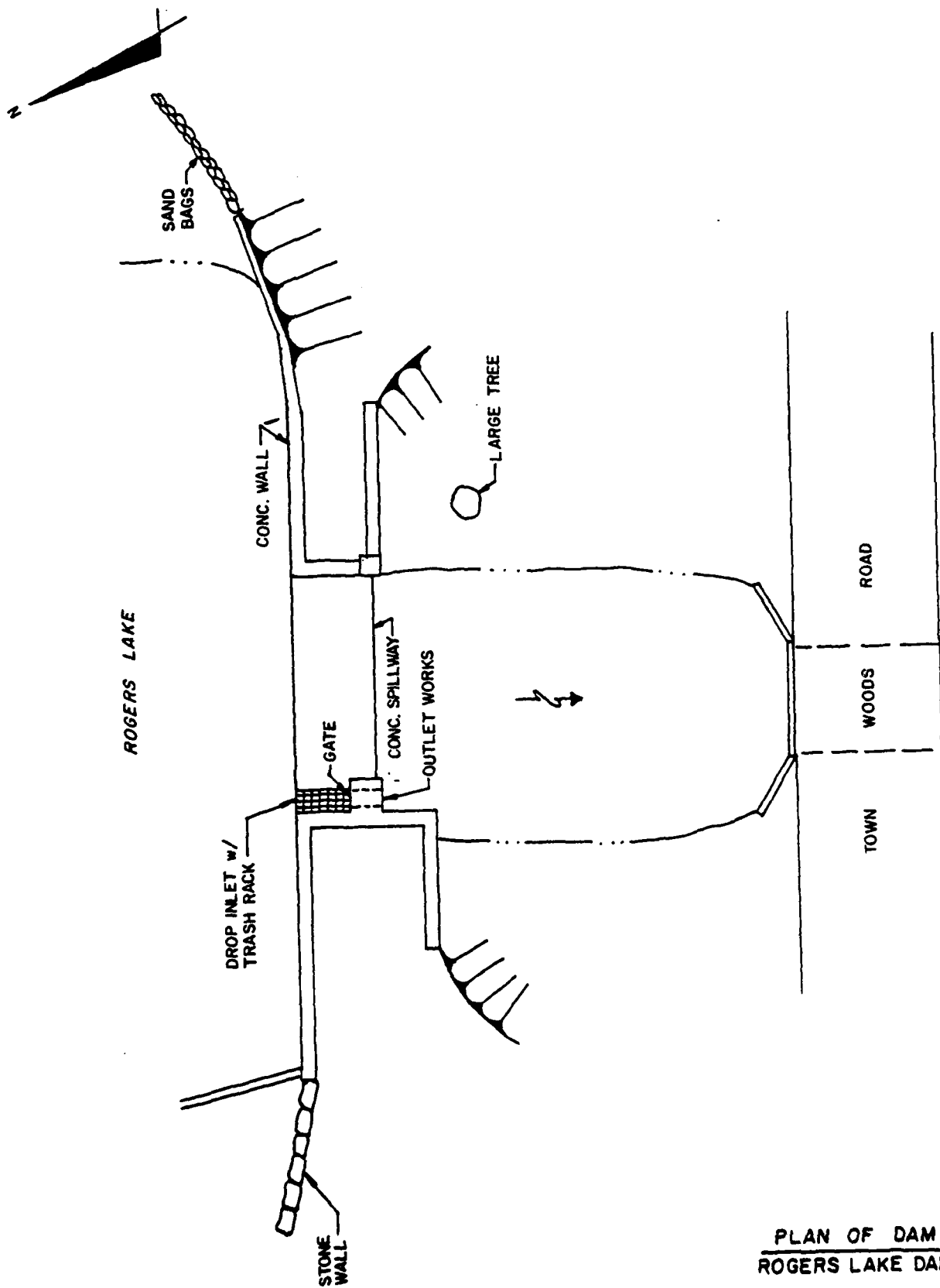
Willis J. Snow
Principal Engineer

WJS/jb

cc: Mr. Paul W. Hains,
First Selectman

APPENDIX B-3

PLANS, SECTIONS AND DETAILS



PLAN OF DAM
ROGERS LAKE DAM

APPENDIX C

PHOTOGRAPHS

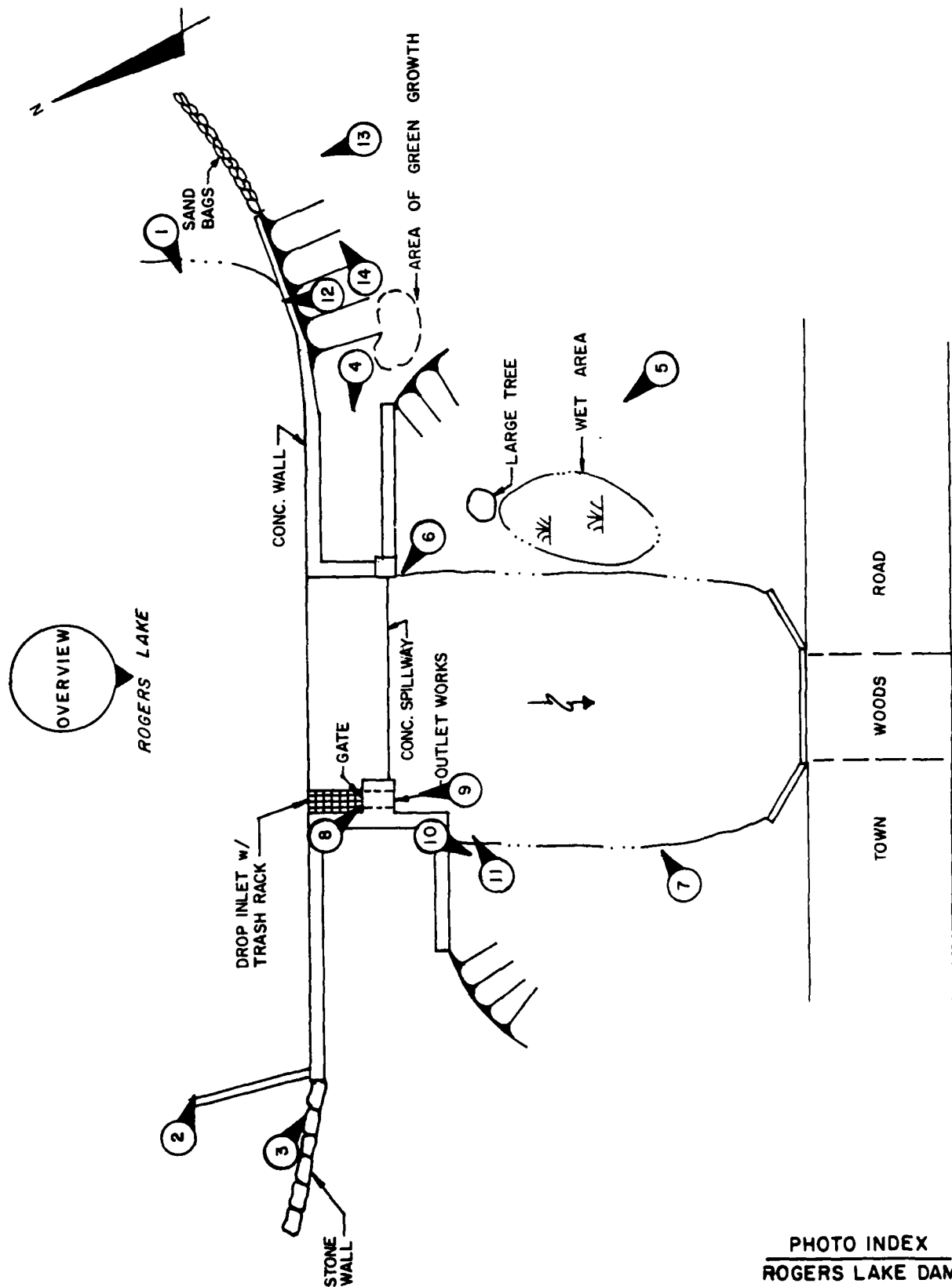


PHOTO INDEX
ROGERS LAKE DAM



PHOTO C-13 Washout area near left abutment of dam.



PHOTO C-14 Washout area. Note remains of sand bags.



PHOTO C-11 Seepage area at
base of dam.



PHOTO C-12 Cracking of concrete wall upstream face of dam.



PHOTO C-9 Outlet works,
discharge.



PHOTO C-10 Spillway and outlet works discharge channel.



PHOTO C-7 Spillway and embankments from downstream right side.

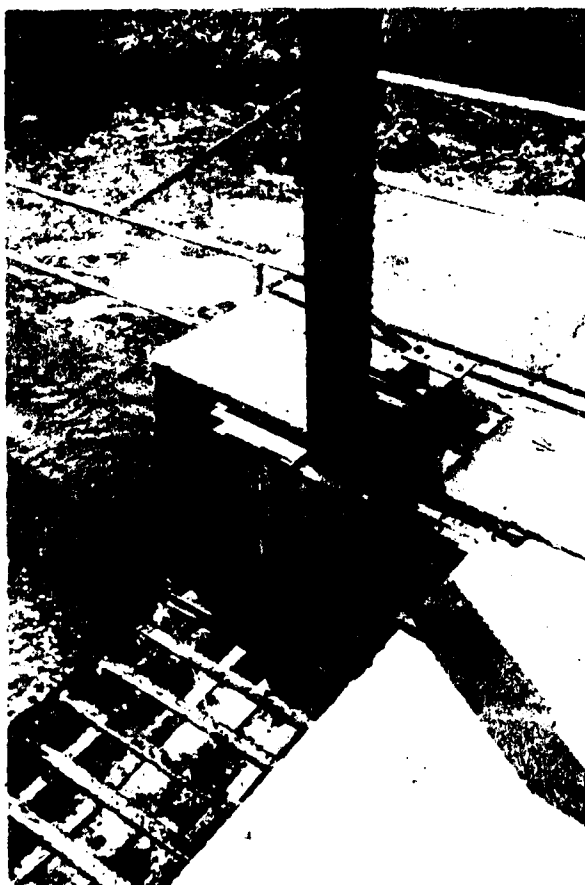


PHOTO C-8 Outlet works intake structure and gate control.



PHOTO C-5 Spillway and embankment from downstream
left side.



PHOTO C-6 Spillway from left side.



PHOTO C-3 Crest of embankment from right abutment.



PHOTO C-4 Crest of embankment from left side.



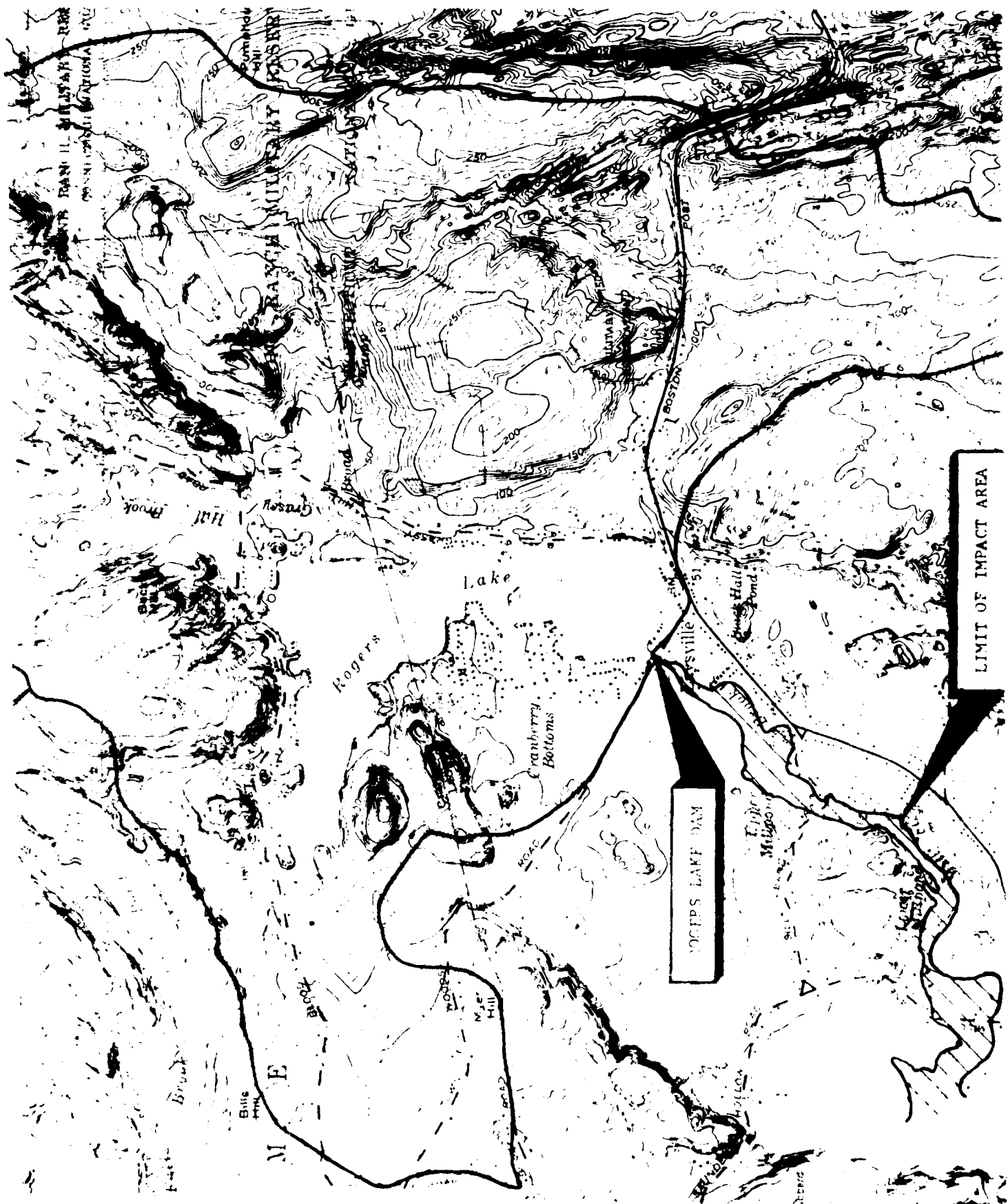
PHOTO C-1 Upstream face of dam from left side.



PHOTO C-2 Upstream face of dam from right side.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS



A. Size ClassificationRogers Lake DamHeight of dam = 7.0 ft.; hence SmallStorage capacity at top of dam (elev. 38.5) = 1275 AC-FT.; hence IntermediateAdopted size classification INTERMEDIATEB. Hazard Potential

This dam is classified as a SIGNIFICANT hazard potential structure because its failure could result in loss of less than a few lives, inundation of 5-10 dwellings and damage to Town Woods Road, Sill Lane and Mill Lane. Utility services within the rights of way may be temporarily disrupted. It is estimated that the failure discharge of 4122 CFS will travel downstream through the Mill Brook streambed with velocities of up to 20 feet per second.

C. Adopted ClassificationsHAZARDSIZETEST FLOOD RANGE
SIGNIFICANT INTERMEDIATE Half PMF to Full PMF
Adopted Test Flood = Half PMF = 500 CSM= 4000 CFSD. Overtopping PotentialDrainage Area = 8.0 sq. milesSpillway crest elevation = 36.0 NGVDTop of Dam Elevation = 38.5 NGVD

Maximum spillway discharge

Capacity without overtopping of dam = 344 CFS"test flood" inflow discharge = 4000 CFS"test flood" outflow discharge = 2550 CFS

% of "test flood" overflow carried

by spillway without overtopping = 13 %

"test flood" outflow discharge portion

which overflows over the dam = 2206% of test flood which overflows over the dam = 87 %

NAME OF DAM: ROGERS LAKE DAM

ESTIMATING EFFECT OF SURCHARGE STORAGE ON "TEST FLOOD"

A. This routing of floods through the reservoir was carried out according to the guidelines established by the Corps of Engineers in Phase I Inspection for Dam Safety Investigations issued in March, 1978.

B. Formulas used are as follows:

- i. For no overtopping: $Q = C_1 B_1 h_1^{3/2}$
 For overtopping: $Q = C_1 B_1 [h_2 + F.B.]^{3/2} + C_2 B_2 h_2^{3/2}$
 For open channel flow: N/A
 For orifice flow: N/A

Where C_1 = coefficient of discharge for spillway; B_1 = length of spillway
 C_2 = coefficient of discharge for dam; B_2 = length of dam
 h_1 = head over spillway crest (feet); h_2 = head over dam (feet)
 $F.B.$ = distance between spillway crest and top of dam

- ii. Surcharge storage in inches = $S = 12 (h_1 + h_2) \frac{S.A.}{D.A.} = 0.633h$
 where S.A. = surface area +
 D.A. = drainage area in sq. miles

- iii. $Q_{outflow} = Q_{inflow} (1 - \frac{S}{Re})$; where Re = effective rainfall = 9.5"

- iv. Length of dam = 96.0 ft. ; Top of Dam elev. = 38.50 ; c for dam = 3.0
 Length of spillway = 29.0 ft. ; Spillway crest el. 36.0 ; c for spillway = 3.0

$$Q = 3 \times 29 (2.5 + h_2)^{1.5} + 3 \times 96 h_2^{1.5} \text{ where } h_2 \text{ is head over top of dam}$$

$$S = \text{Storage in inches} = 12h \frac{S.A.}{D.A.} = 0.633h \text{ where } h \text{ is head over spillway crest}$$

- v. $Q_{inflow} = 4000 \text{ C.F.S.}$

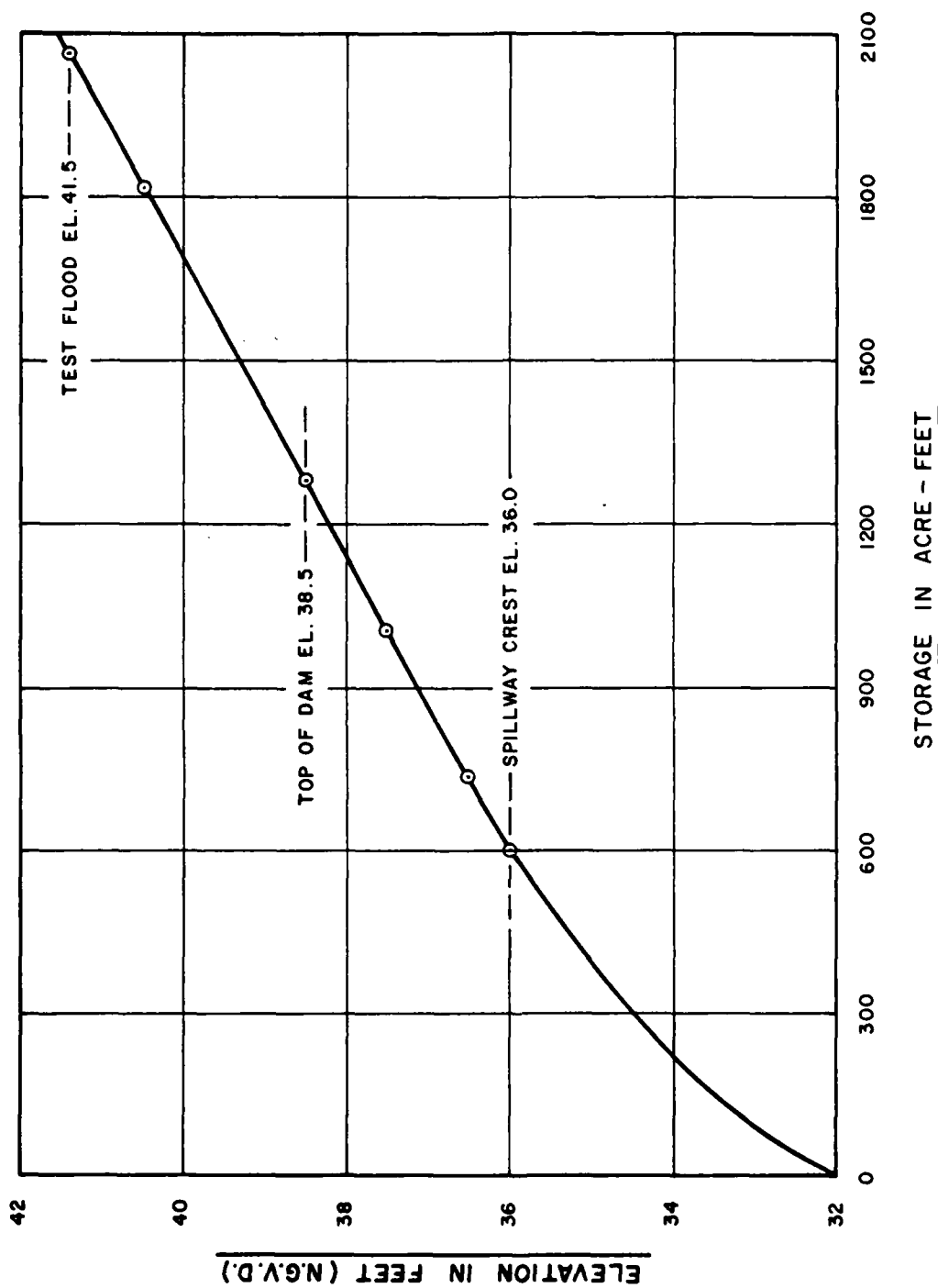
Q in CFS	Elevation	Total Head over crest $h_1 + h_2 = h$	Storage in inches = S	Remarks
3733	37	1.0	0.633	
3200	39	3.0	1.899	
2667	41	5.0	3.165	
2134	43	7.0	4.431	
1601	45	9.0	5.697	
2550	41.5	5.5	3.481	

"Rule of Thumb Guidance for Estimating
Downstream Dam Failure Discharge"

BASIC DATA

Name of dam Rogers Lake Dam Name of town Old Lyme, CT
 Drainage area = 8.0 sq. mi., Top of dam 38.50 NGVD
 Spillway type = Free vertical fall overflow weir Crest of spillway 36.0 NGVD
 Surface area at crest elevation = 270 Acres = 0.422 sq. mi.
 Reservoir bottom near dam = 31.50 NGVD
 Assumed side slopes of embankments 2:1
 Depth of reservoir at dam site = = y_0 = 7.0 ft.
 Mid-height elevation of dam = 34.0 NGVD
 Length of dam at crest = 125.0 ft.
 Length of dam at mid-height = 100.0 ft.
25% of dam length at mid-height = W_b = 25 ft.
 Width of channel immediately downstream = B = 25 ft.; Shape of breach = rectangular

Elevation (NGVD)	Estimated Storage in AC-FT	
36.00	600	Spillway Crest Elevation
36.50	735	
37.50	1005	
38.50	1275	Top of Dam Elevation
40.50	1815	
41.50	2058	Test Flood Elevation



STORAGE-ELEVATION CURVE
ROGERS LAKE DAM

ROGERS LAKE DAM

1. DAM FAILURE ANALYSIS

A. Failure Analysis

$$\begin{aligned}\text{Discharge} &= \frac{8}{27} W_B \sqrt{g} y_o^{1.5} \\ &= 1.68 W_B y_o^{1.5} \\ &= 778 \text{ C.F.S.}\end{aligned}$$

C.F.S.

B. Maximum Spillway

Discharge with W.S.E.

At top of Dam @ $\quad \quad \quad = 344 \quad \quad \quad \text{C.F.S.}$

C. Total Dam Failure Discharge $\quad \quad \quad 1122 \quad \quad \quad \text{C.F.S.}$

D. Reservoir - Storage Data:

Volume of storage at spillway crest = $600 \text{ AC-ft. @ Elev. } 36.0$

Surcharge storage at top of dam = $675 \text{ AC-ft. @ Elev. } 38.5$

Storage Total = $1275 \text{ AC-ft. @ Elev. } 38.5$

E. Flood Discharge Channel

1. Maximum depth of flow just D/S of Dam = $\frac{4}{9} y_o = 3.11 \text{ feet}$

Notes:

1. Failure of dam is assumed to be instantaneous. When pool reaches top of dam, and is a full-depth partial width rectangular shape failure with a width of failure = $W = 25$ feet and depth of failure $y_o = \quad = 7.0$ feet.
2. Steady, uniform flow phenomenon is assumed for determination of failure profile and is based on Manning's formulae.
3. Failure profile for impacted area determination is determined at one typical cross section in the downstream channel. Reduction in discharge due to available storage has been taken into account.

ii. Reach 1

Length = 11000 feet; Station 0 to Station 110+0; $n = 0.05$

Bed slope = $S_0 \approx S_f = 0.0025$; Bed width = $b = 38$ feet

Bed width is scaled from U.S.G.S. map; scale 1" = 2,000 feet

As bed width is large and 1" = 2,000 feet and 10-foot contour interval scale maps are being used for various channel parameters, it is appropriate to assume that $d = R = \text{Hyd Radius} = \text{depth}$, hence Manning's formulae is transformed:

$$Q = A \frac{1.49}{n} R^{2/3} \sqrt{S} = bd \frac{1.49}{n} d^{2/3} \sqrt{S}$$

$$Q = b \frac{1.49}{n} \sqrt{S} d^{5/3} = Kd^{5/3} = 57d^{5/3}$$

State Discharge Relationship for Reach 1

Depth = d in Feet	Stage of Elevation	Discharge in CFS = Q	Velocity in ft./sec.	Storage Volume in AC-ft. = V
0	18.0	0	0	0
2	20.0	181	2.38	22.8
4	22.0	574	3.77	45.6
6	24.0	1128	4.94	68.4
8	26.0	1821	5.99	91.2
10	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A

- F. Water surface profiles resulting from maximum spillway discharge and also from dam failure discharge are shown on Plate D-13 for comparison purposes. This figure also shows the rise in water depth due to failure of dam.

Also, Discharge -- Depth and Storage-depth curves are shown on Plate D-12 for downstream channel.

Notes: 1. Storage volume in AC-ft = $\frac{(\text{Length of Reach}) (\text{Bed Width}) (\text{Depth})}{43,560}$

2. Failure discharge being large will mostly be overbank flow on existing channel.

G. For $Q_1 = 1122$ CFS; depth = 6.0 ft. $V_1 = 68$ AC-ft.

$$\text{Trial } Q_2 = Q_1 \left(1 - \frac{V_1}{\text{Storage}} \right) = 1122 \left(1 - \frac{68}{1275} \right) = 1062 \text{ CFS}$$
$$\therefore V_2 = \text{AC-ft.}$$

$$\text{Avg } V = \frac{V_1 + V_2}{2} = 66 \text{ AC-ft.}$$

$$\therefore Q_2 = Q_1 \left(1 - \frac{V \text{ Avg.}}{\text{Storage}} \right) = 1064 \text{ CFS; } y_2 = 5.8 \text{ ft.}$$

Depth at center of flood as adopted = 6.0 ft.

Additional dam failure analysis beyond Reach 1 has not been undertaken because the depth of flow of 5.8 feet at the end of Reach 1 will not cause any hazardous conditions further downstream. The failure discharge and depth will continually decrease beyond Reach 1.

SUMMARIZED AND ADOPTED VALUES

FOR

DAM FAILURE ANALYSIS

- i. Name of Dam Rogers Lake Dam
- ii. Dam Failure Discharge _____ = 778 cfs.
- iii. Maximum Spillway Discharge _____ = 344 cfs.
- iv. Total Dam Failure Discharge _____ = 1122 cfs.
- v. Normal (Manning Depth) for 1122 = 6.0 feet
- vi. Normal (Manning Depth) for 344 = 4.0 feet
- vii. Increase in depth due to failure of dam = 2.0 feet
- viii. W.S.E. prior to failure = Ground Elevation + 4.0
- ix. W.S.E. after failure = Ground Elevation + 6.0

Note: The adopted depth of flow values are assumed to be accurate representations of damages in the impacted areas. Professional judgement is used in these final adopted values.

ROGERS LAKE DAM

COMPUTATIONS FOR SPILLWAY RATING CURVE AND OUTLET RATING CURVE COMPUTATIONS

Spillway width = 29.0 feet; Spillway crest elevation = 36.0 NGVD
Length of dam = 125(including spillway) feet; Top of dam elevation = 38.5 NGVD
c = 3.0

i) SPILLWAY RATING CURVE COMPUTATIONS

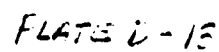
Elevation (ft.) NGVD	Spillway Discharge (CFS)	Remarks
36.0	0	Spillway Crest Elevation
36.5	31	
37.0	87	
37.5	160	
38.0	246	
38.5	344	Top of Dam Elevation
39.0	554	
40.0	1225	
41.0	2111	Test Flood Elevation
41.5	2550	
42.0	3165	
44.0	3854	

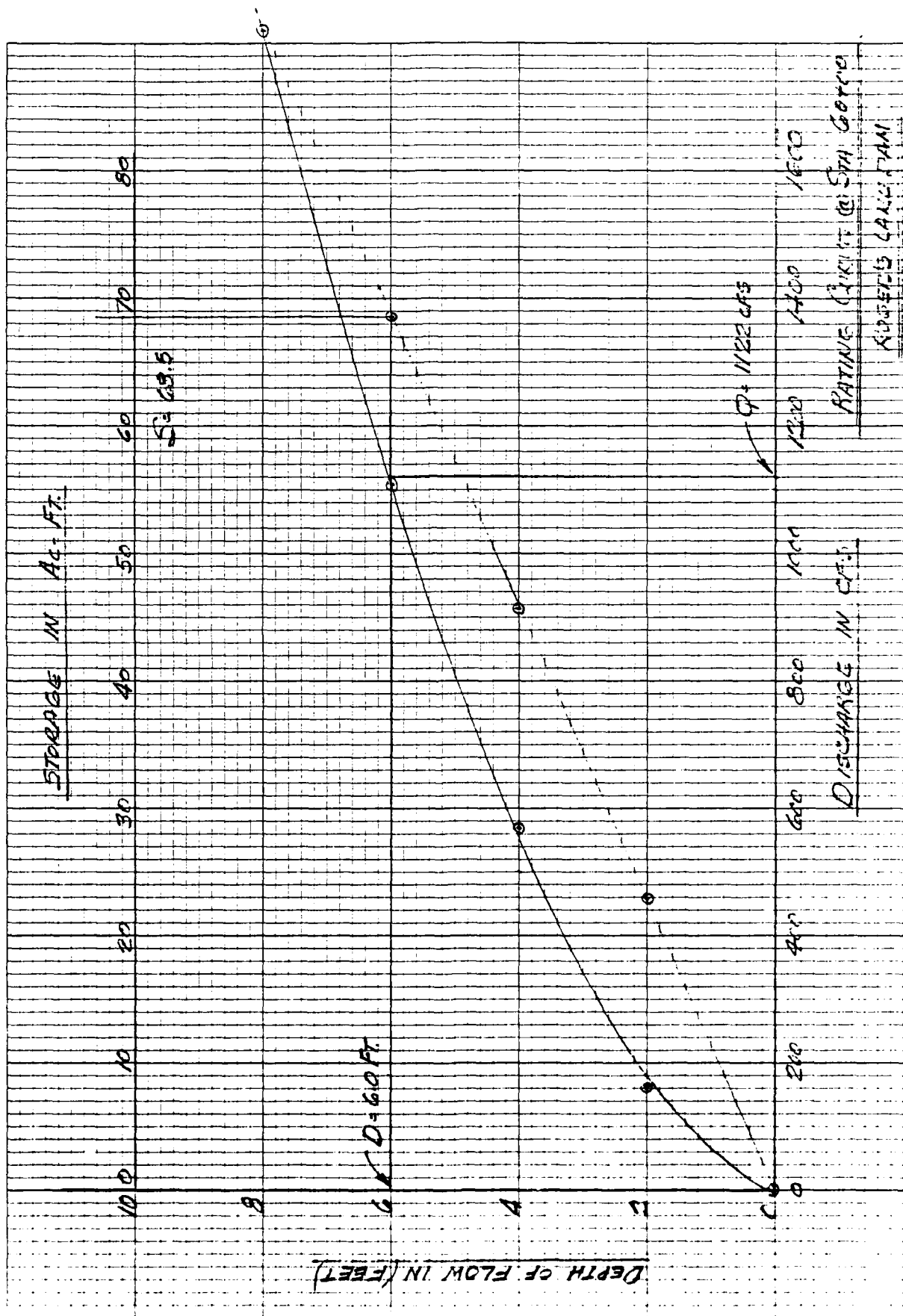
ii) OUTLET RATING CURVE COMPUTATIONS

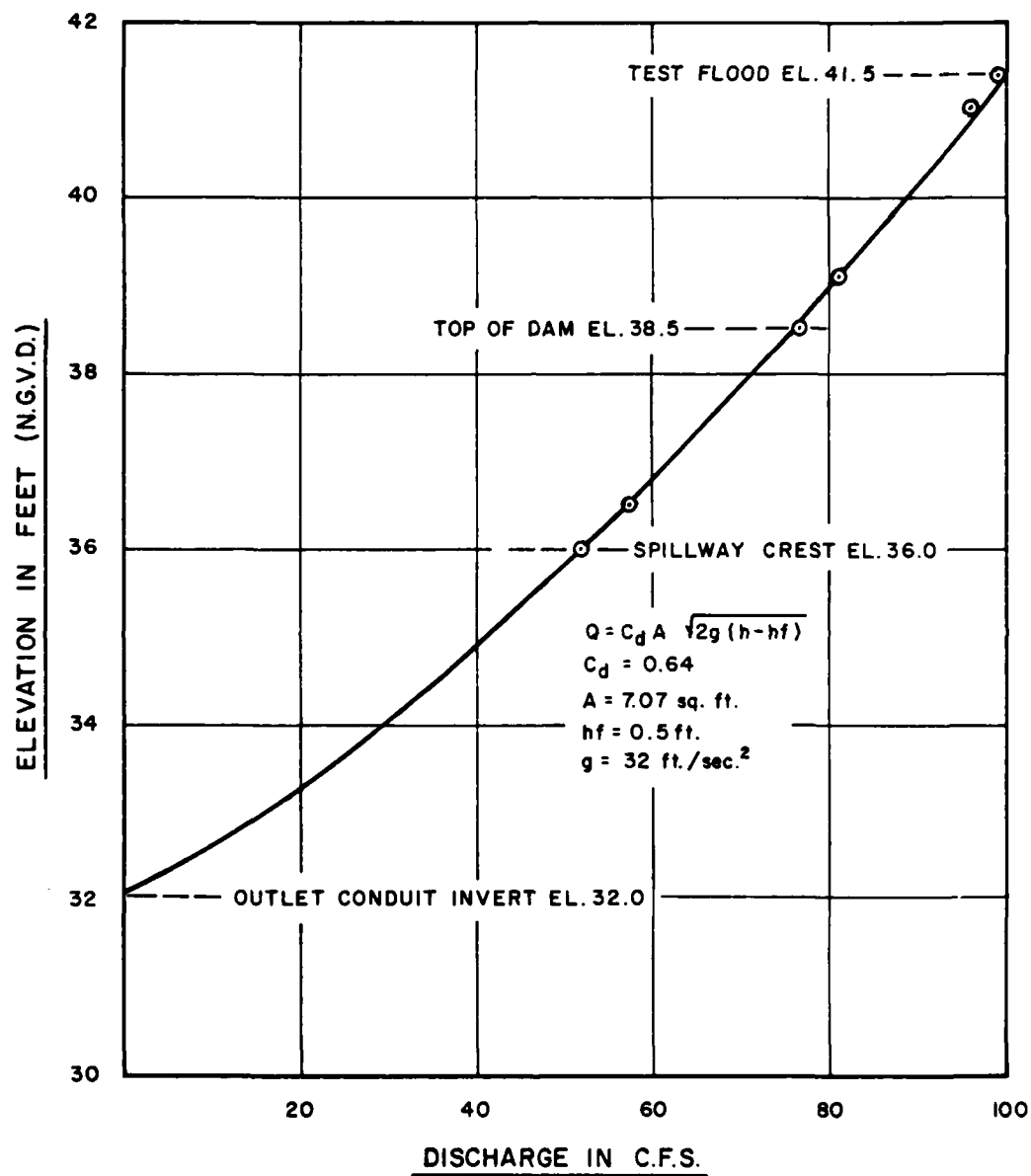
Elevation (ft.) NGVD	Discharge (CFS)	Remarks
41.5	99.4	Test Flood Elevation
41.0	96.0	
39.0	81.1	Top of Dam Elevation
38.5	77.0	
36.5	57.3	
36.0	51.3	Spillway Crest Elevation
32.0	0	
		Invert Elevation

Size of outlet = 36 inch dia. pipe; Area of outlet = 7.07 sq. ft.
Invert of outlet = 32.0; Center line of outlet = 33.5









OUTLET RATING CURVE
 ROGERS LAKE DAM

APPENDIX E

INFORMATION AS CONTAINED IN THE
NATIONAL INVENTORY OF DAMS



INVENTORY OF DAMS IN THE UNITED STATES

STATE	COUNTY	DIST.	COUNTY	STATE	COUNTY	DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY MO YR
CT	J15	N20	CT	J11	02		ROGERS LAKE DAM	4121.0	7218.1	

POPULAR NAME	NAME OF IMPONDMENT
	ROGERS LAKE

REGION	RIVER OR STREAM	NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	DIST FROM DAM (MI.)	POPULATION
0110	MILL BROOK	OLD LYME	0	

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCT. HEIGHT (FT.)	HYDRAU. HEIGHT (FT.)	IMPONDING CAPACITIES (ACRES-FT.)	MAXIMUM	NORMAL
AGGENT	1922	R	9	7	1275	600	

DIST OWN FED R PRV/FED SCS A VIEW/DATE

REMARKS
21-CONCRETE WALLS WITH EARTH FILL

NO. 1	SPILLWAY	MAXIMUM DISCHARGE (CFS)	VOLUME OF DAM (CU YD)	POWER CAPACITY (KW)	INSTALLED	PHOSPHORUS (PPM)	NAVIGATION LOCKS
2	125 U 29	344					

OWNER	ENGINEERING BY	CONSTRUCTION BY
TRAIL OF OLD LYME		

DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE

INSPECTION BY	INSPECTION DATE DAY MO YR	AUTHORITY FOR INSPECTION
CE MAGUIRE INC	15 APR 80	PL 92-367

REMARKS

**LATE
LMED**